**Concept Cluster Conference for Teaching SNC2P Chemistry**

Chemistry: Chemical Reactions and Their Practical Applications  
Designed by Alessia Marchetti, Amy Zhou, Karen Ho, Puneet Kaur

**RESPONSIBILITIES:**

**Review Sheet** *–* Created by Alessia and designed by Amy

**Quiz** *–* Created and marked by Karen

**Concept Cluster/Map** *–* Created and designed by Amy Pg.

**Misconceptions** *–* Compiled by Alessia Pg.

**Effective Instructional Strategies** *–* Compiled by Karen Pg.

**Demonstration** *–* Puneet Pg.

**Activities:**

* *–* Puneet
* Types of Chemical Reactions Skit *–* Karen
* Balancing Chemical Equations With Marshmallows *–* Karen
* *–* Amy
* Testing the Effects of Antacids: Put Out the Fire! *–* Alessia

**Applications and Societal Issues/Implications** *–* Pg.

**Annotated References** *–* Searched for by group and compiled by Alessia Pg.

**Misconceptions That May Be Encountered While Teaching SNC2P Chemistry**

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| **Misconception** | **Explanations** |
| Table salt is the only salt. | Explain to students that ‘table salt’ is an example of a salt but that in chemistry, the term ‘salt’ is used more generally. It is the product of a neutralization reaction between an acid and a base. |
| Ratios of elements in molecular compounds can be simplified. | Unlike ionic compounds, the ratio of elements in molecular compounds cannot be simplified because the ratio represents molecules. |
| Gases are massless. | All gases have a mass. Doing an experiment in which a gas is created (from evaporation, burning, etc.) and trapped can demonstrate this concept. |
| All acids and bases are dangerous. | Many food products are acidic and/or basic and therefore not harmful. Also, most household cleaning agents are bases but are not corrosive enough to cause harm. |
| Any acid (weak or strong) will neutralize any base (weak or strong). | Neutralize depends on the relative strength or pH of the substances. Also, the product of the reaction (salt) may not be neutral. |
| The relationship between lost/gained electrons and charge is often inverted. | The teacher should reinforce that electrons are negatively charged. You could use integer chips/manipulatives to represent the balance  of protons (+) and electrons (−) and give examples to demonstrate how electrons affect charge. |

**Effective Instructional Strategies for Teaching SNC2P Chemistry**

* **Cue cards, flash cards, repetition**
* **Using visuals (eg. videos, demonstrations, manipulatives)**
* **Experiments—lots of them!**
* **Using mnemonics and analogies**

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| **Potential Student Difficulties** | **Possible Solutions** |
| Realizing the relevance in naming and reading chemical compounds | Giving students an example, such as the petition against dihydrogen monoxide may help them to better understand the need for such a system. |
| Trouble mastering chemical nomenclatures | Provide several opportunities for students to practice chemical nomenclature (eg. having a quiz at the beginning of each class). Also encourage students to use cue cards for the rules of nomenclature and flash cards to practice naming. |
| Difficulty in remembering the different signs of chemical change | You can use the following demonstrations to help them remember:   * To show the formation of a precipitate: add copper(II) sulphate to sodium hydroxide * To show the release of heat and light: light magnesium ribbon on fire * To show the production of gas: add a small piece of calcium metal in water * To show a colour change: add a few drops of phenolphthalein into sodium hydroxide |
| Engaging students in chemistry can be a challenge | Showing students videos or demonstrations which display concepts being taught may pique their interests and inspire a curiosity to learn more about the subject. Here are four videos sure to get them excited about the different types of reaction:   * Synthesis of NaCl from its elements (Na + Cl2 → NaCl)   + Link: <http://www.youtube.com/watch?v=Mx5JJWI2aaw> * Decomposition of nitrogen triiodide (NI3 → N2 + I2)   + Link: <http://www.youtube.com/watch?v=2KlAf936E90> * Single displacement reactions of the alkali metals (Rb + H2O → Rb2O + H2 and Cs + H2O → Cs2O + H2)   + Link: <http://www.youtube.com/watch?v=m55kgyApYrY> * Double displacement reactions of silver nitrate and sodium hydroxide (Ag(NO3) + Na(OH) → Ag(OH) + Na(NO3))   + Link: <http://www.youtube.com/watch?v=SuoN0hQPeMw> * *Note: You may want to use* [*www.keepvid.com*](http://www.keepvid.com) *to upload the videos onto your computer*   You may also want to check out your school library for videos (e.g., Bill Nye the Science Guy series) |
| Difficulty in remembering the names of the different types of reactions and what they entail | Manipulatives and relationship analogies would be useful in illustrating the different types of reactions. |
| Difficulty in understanding that each type of atom must be balanced in a balanced chemical equation | You can use Legos or other manipulatives that come in varying sizes to help students understand this concept by emphasizing how the masses differ for different atoms. |
| Difficulty in remembering which numbers correspond to acids and bases on the pH scale | A good strategy is to use mnemonics, such as Bigger numbers for Basic. |

**Applications and Societal Issues/Implications**

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**Annotated Bibliography for SNC2P Chemistry**

**Health and Safety Information on Household Products**

This resource lists the health and safety information for commonly used household products as well as chemicals, pesticides, and even beauty products. This is a great resource to address the curriculum expectations which address learning about household hazards. Also, this gives students an opportunity to learn about hazards that they had previously not considered. Student handouts and/or assignments could be made to scaffold the activity.

U.S. Department of Health and Human Services. (June 2010). *Household Products Database: Health and Safety Information on Household Products.* Retrieved from <http://householdproducts.nlm.nih.gov/index.htm>.

**LiveChem**

This resource allows students to compare the effects of combining different salts and reagents together. This can allow students to investigate the properties of salts and also address the misconception that ‘table salt’ is the only salt. Although the content may be slightly advanced for an applied class, it can still serve to address misconceptions.

Adcock, O. (2005). *LiveChem*. Retrieved from <http://www.chem.ox.ac.uk/vrchemistry/livechem/transitionmetals_content.html>.

**National Resource Council of Canada**

This website, which is run by the Government of Canada, provides several FREE resources which can be ordered and given out to students. These include periodic tables of the elements, constellation tables and graphs, and much more. Printed resources can be ordered at no cost. It also provides links to current articles and research by scientists and high school students alike. Handouts, curriculum connections, and interactive activities are also available.

National Research Council of Canada. (2011). *Teacher’s Corner*. Retrieved from <http://www.nrc-cnrc.gc.ca/eng/education/biology/index.html>.

**Steve Spangler Science**

This resource contains ideas for labs and demonstrations as well as the apparatus needed to run them. It has several videos explaining how demonstrations and labs work and tips for how to run them.

Steve Spangler Science. (2001). *Steve Spangler Science: Making Science Fun.* Retrieved from http://www.stevespanglerscience.com